UNCLASSIFIED

NAVSHIPS NUMBER 0967-386-6010

OVERHAUL AND REPAIR MANUAL

FOR

TRANSMITTER, RADIO

T-1132, 1133, 1134 and 1135/PRT

AND

DECODER-INDICATOR KY-671/U

DEPARTMENT OF THE NAVY

NAVAL ELECTRONIC SYSTEMS COMMAND

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BER	NOMENCLATURE	
	DECODER-INDICATOR KY-671/U	
	CABLE ASSY,POWER,ELECTRICAL	
	CABLE ASSY,SPECIAL PURPOSE,ELECTRICAL	
	CABLE ASSY,POWER,ELECTRICAL	
	CABLE ASSY,SPECIAL PURPOSE,ELECTRICAL	
	REMOTE ALARM INDICATOR LAMP ASSY	
	TRANSMITTER,RADIO T-1132/PRT	*HELICOPTER INSTALLATION ONLY
	ANTENNA ASSEMBLY	
	BRACKET,MOUNTING	
	POWER DIVIDER	

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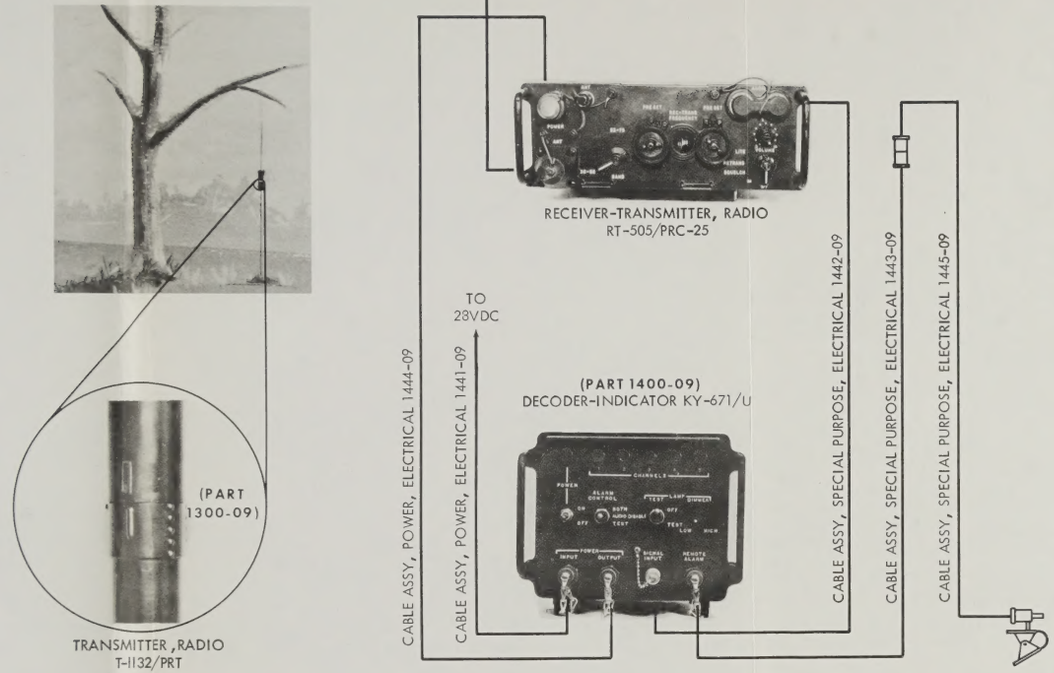
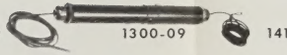


1447-09*

1491-09*

1400-09


1417-09 1300-09 1417-09

1441-09

1442-09

1444-09

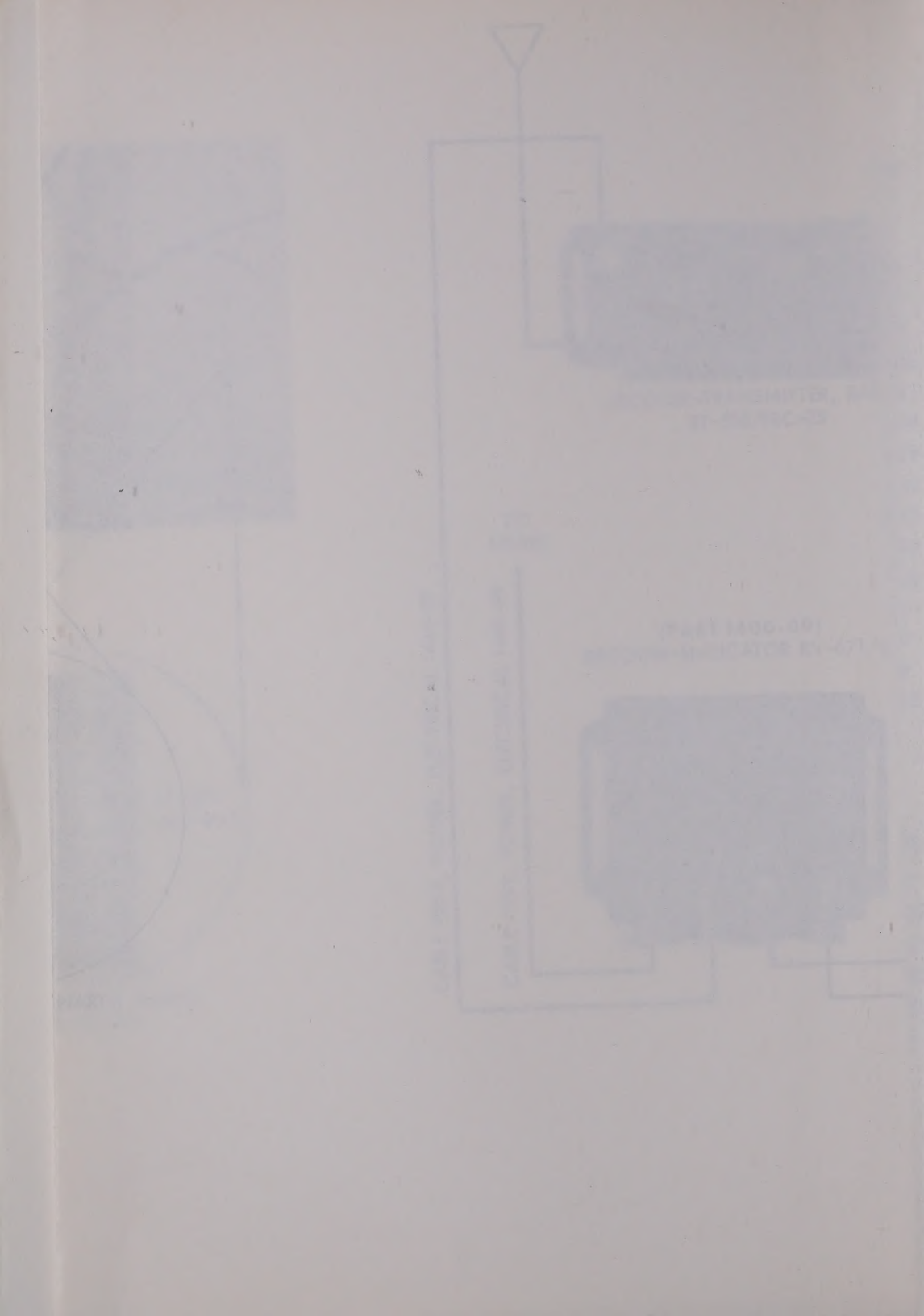
1443-09

1445-09

PART NUMBER	NOMENCLATURE
1400-09	DECODER-INDICATOR KY-671/U
1441-09	CABLE ASSY, POWER, ELECTRICAL
1442-09	CABLE ASSY, SPECIAL PURPOSE, ELECTRICAL
1444-09	CABLE ASSY, POWER, ELECTRICAL
1443-09	CABLE ASSY, SPECIAL PURPOSE, ELECTRICAL
1445-09	REMOTE ALARM INDICATOR LAMP ASSY
1300-09	TRANSMITTER, RADIO T-1132/PRT
1417-09	ANTENNA ASSEMBLY
1447-09	BRACKET, MOUNTING
1491-09	POWER DIVIDER

*HELICOPTER INSTALLATION ONLY

Figure I-1. Transmitter, Radio T-1132/PRT, Decoder-Indicator KY-671/U, and Accessory Items and Cables



PART I - INTRODUCTION

Section I-1. System Information

The Transmitter, Radio T-1132 through 1135/PRT* (hereinafter called the Transmitter) and the Decoder-Indicator KY-671/U (hereinafter called the Decoder), allow the transmission and automatic monitoring and reception of simple coded signals. The Transmitter is for field use and the Decoder is installed aboard a small craft or helicopter. In a helicopter installation, a special mounting (Part 1447-09) and a power divider (Part 1491-09) are required. The equipment, accessory items and cables, and a pictorial diagram of a typical equipment setup are illustrated in Figure I-1. Weights and measurements data are given in Table I-1. The equipments are designed to operate in conjunction with an AN/PRC-25** receiver, which converts the radio frequency signal received from the Transmitter into an audio frequency signal for decoding by the Decoder.

The Transmitter is a small, battery-operated, flashlight-size device with two antennas (actually, an antenna and a counterpoise). The Transmitter is activated by rotating the larger diameter portion of the barrel with respect to the smaller diameter portion, aligning the index mark with one of five lines of raised dots (see Figure I-1). In operation the antennas must be held vertically in a straight line by hanging the entire Transmitter from any convenient support using the loop in the end of one of the antennas.

---

*The only differences among the four Transmitter units are the RF operating frequencies.

**The full nomenclature of this unit is RT-505/PRC-25. The system can also operate in conjunction with an RT-524/VRC-12 or RT-841/PRC-77.

Table I-1. Weights and Dimensions

NAME	PART NO.	NOMENCLATURE	WEIGHT	DIMENSIONS
Decoder-Indicator Set	1400-09	Decoder-Indicator KY-671/U	12.0*lb	
Decoder-Indicator	1464-09		9.3 lb	8-1/8" x 7-5/8" x 9-1/8"
Power Input Cable	1441-09	Cable Assy, Power, Electrical	11.4 oz	10 ft long
Audio Input Cable	1442-09	Cable Assy, Special Purpose	4.7 oz	3 ft long
AN/PRC-25 Power Cable	1444-09	Cable Assy, Power, Electrical	15.1 oz	10 ft long
Remote Alarm Extension Cable	1443-09	Cable Assy, Special Purpose	7.0 oz	10 ft long
Remote Alarm Indicator Assembly	1445-09	Remote Alarm Indicator Lamp Assy	4.9 oz	3 ft long
Transmitter Set	1300-09***	Transmitter, Radio T-1132/PRT	12.0 oz**	10-3/8" x 1-3/8"D
Battery, 13.5-Volt	1484-01		7.5 oz	4-15/16" x 31/32"D
Antenna Assembly	1417-09	Antenna Assembly	1.05 oz	5'3" - 1/4"
Helicopter Mount	1447-09	Bracket, Mounting	4.6 lb	11-3/4" x 8-15/16" x 9"
Diplexer	1491-09	Power Divider	3.8 oz	2-27/64" x 1-27/64" x 3/4"

*This weight includes weights of cables and Remote Alarm Indicator.

**Transmitter weight less battery.

***Part numbers 1300-19, 1300-29, and 1300-39 apply to transmitters T-1133/PRT, T-1134/PRT, and T-1135/PRT respectively.

When activated, the Transmitter sends a single coded signal continuously for one hour and then automatically turns itself off.

The transmitted RF signal is received by an AN/PRC-25 receiver which delivers the resultant audio frequency code to the Decoder.

The coded audio signal from the AN/PRC-25 consists of a 60-millisecond (msec) tone burst at one of five frequencies repeated once every five seconds. Settings on the Transmitter select the tone frequency, each of which will light one of the five CHANNEL lights on the front panel of the Decoder. If four tone bursts are received on a single channel in any 30-second period, an audible alarm will sound, and if desired, a REMOTE ALARM indicator lamp will be lighted. (Audible alarm may be muted if desired.)

Section I-2. Scope

This manual is intended to provide overhaul and repair instructions (including detailed performance testing and check-out) for use by technicians at a depot-level maintenance facility. Installation, operation, and maintenance instructions for field-level activities are contained in NAVSHIPS 0967-871-3890.

The Transmitter and Decoder can operate only in conjunction with one another, but they have been nomenclatured as two separate equipments and not as parts of a system. For convenience, this manual covers both equipments in one volume. Part II covers the Decoder and Part III the Transmitter. Each part is essentially a complete overhaul and repair manual with only a minimum of cross referencing to avoid unnecessary duplication.

PART II - DECODER-INDICATOR KY-671/U OVERHAUL AND REPAIR

Section II-1. General Information

II-1.1 Introduction (See Part I for System Information)

The Decoder-Indicator KY-671/U consists of an outer casing with attached switches and indicator lights, two (2) terminal board assemblies, seven (7) circuit cards, and associated cable assemblies. Field-level repair is confined to replacement of circuit cards as units and replacement of minor items on the front panel and the two terminal bracket assemblies.

II-1.2 Scope

This manual provides instructions and procedures for general overhaul, repair, and testing of the Decoder. Instructions are arranged to provide for the case in which an entire Decoder unit has been received for overhaul. The normal sequence of events in this case is as follows:

(1) Perform system checkout given in paragraph II-5.2.1 using an operable transmitter.

(2) Perform the Decoder-Indicator checkout given in paragraph II-5.2.2.

(3) Troubleshoot in accordance with NAVSHIPS 0967-871-3890.

(4) Test and repair circuit cards in accordance with paragraph II-5.2.3 and II-5.2.4.

(5) Clean as per Section II-4.

(6) Perform Visual Inspection given in paragraph II-5.1 and repair as necessary.

(7) Reassemble and test in accordance with Section II-8.

In that case in which only repairable circuit cards have been received, checkout procedures for individual cards, as given in paragraphs II-5.2.3 or II-5.2.4, may be conducted immediately. The functional description given in paragraph II-1.3 will aid in locating the malfunction once the general nature of the trouble has been determined.

II-1.3 Functional Description

A complete simplified functional block diagram of the Decoder is given in Figure II-1. A complete schematic of the unit is included in NAVSHIPS 0967-871-3890.

In this volume all input parameters are varied by input signal simulators; however, the following description will discuss only the way that the equipment is intended to normally operate.

The signal from the Transmitter, consisting of a 60-millisecond "tone burst" of RF energy every 5 seconds, is received by the AN/PRC-25. The AN/PRC-25 is set to the RF channel that corresponds to the marking on the Transmitter. The output of the AN/PRC-25 is a 60-millisecond audio tone burst at a frequency corresponding to one of the five channels. A limiter in the Alarm Logic/Power Supply card delivers a constant amplitude audio burst to each of the decoder cards. A tone filter in one of the cards will allow the signal to pass - the remaining four cards will reject the signal. After the audio burst passes the tone filter it is detected to form a 60-millisecond DC pulse. Timer circuits check the pulse to assure that it is not either too long or too short and then activate a 3-second timer that

lights the CHANNEL INDICATOR. A counter and 30 second reset timer count the pulses received and, when four pulses have been received in any 30-second period, activate a 10-second timer which in turn activates a buzzer and remote alarm indicator. The entire circuit is reset (1) if the 30-second timer runs out without counting four pulses, or (2) after the 10-second timer runs out.

The following paragraphs provide a detailed functional description to assist the technician in trouble isolation. A Functional block diagram is provided in Figure II-1, and a timing logic diagram is provided in Figure II-2.

A limiter circuit (transistors Q9 and Q10) is provided on the Alarm Logic/Power Supply Card (1A1A2A6) to compensate for various settings of the VOLUME control on the AN/PRC-25 and for various levels that might be encountered if other receivers were used. The audio output of the limiter is sent to each of the five Decoder cards (1A1A2A1 through 1A1A2A5) which are identical except for the frequency at which they are activated (see paragraph II-1.4.3).

Transistors Q1 and Q2 on the Decoder card act as a hard limiter and constant current stage which drives a double-tuned tone filter. The tone filter's output is connected to threshold detector Q3. Energy in the audio signal must be concentrated into a rather narrow band around the tone filter frequency before Q3 can be activated. The output of Q3 is amplified by buffer stages Q28, Q4 and used to drive transistor switch Q5. The output of Q5 provides power to two integrator circuits (R13,C8 and R24,C11) and two programmable unijunction timer (PUT) circuits (Q6 and Q10)*

*The same programmable unijunction timer circuit is used in several places in the Decoder. The Short Integrator circuit will be discussed in detail to illustrate the way in which it operates. The operation of the others is essentially identical.

The charge path for capacitor C8 is through diode CR3 and resistor R13. Diode CR3 prevents C8 from discharging through other circuits when the signal stops. A discharge path to ground is provided through R12 if the signal is too short to allow C8 to charge to the firing voltage of PUT Q6.

C8 charges until the voltage exceeds the voltage of the tap on adjustable resistor R16. At this time PUT Q6 conducts, completely discharging C8 through R14. This action provides an output pulse to the short integrator flip-flop circuit, Q7, Q8, and Q9. The output of Q9 charges capacitor C14 (through CR5 and R35) in the pulse generator circuit Q15 and Q16. If the received pulse is of the proper length when it stops (and Q5 stops conducting), the power will be removed from the short integrator flip-flop Q7, Q8 and Q9 and the voltage will drop at the anode end of CR5. The charge held by C14 thus cannot escape through CR5, and, as will be discussed later, Q14 is being held in the nonconducting state by the long integrator flip-flop Q11, Q12, and Q13. The base of Q15 is now negative with respect to the emitter, the charge on C14 is discharged through Q15 (with some regenerative assistance from Q16), and a pulse is sent to the 3-second flip-flop Q17, Q18, Q19, and Q20.

If the received pulse had been too long, the action of the circuit would have been inhibited as follows: when transistor switch Q5 started to conduct it was also charging C11 through CR4 and R24. If the pulse had been long enough to allow the voltage on C11 to exceed the voltage of the tap on adjustable resistor R27, then PUT Q10 would have sent a pulse to the long integrator flip-flop Q11, Q12, and Q13. The output of Q13 would then have activated dump circuit Q14 which would discharge C14, thus inhibiting any further response to that received signal.

In the case where the signal was of the proper length and the 3-second flip-flop Q17, Q18, Q19, and Q20 was set, the output of Q19 provides an input to three circuits. The first is clock amplifier Q22 and Q23, the second is lamp driver Q21, and the third is a PUT timer circuit Q27 (set by ajustable resistor R72) that resets the 3-second flip-flop through Q20 after 3 seconds. The lamp driver Q21 lights the proper CHANNEL lamp on the front panel for 3 seconds.

The output of the clock amplifier drives integrated circuit counter Z1A - Z1B and reset timer flip-flop Z2B. If three more pulses are received in the next 30 seconds, counter Z1A - Z1B will set memory flip-flop Z2A which sends an "Alert" signal to the Alarm Logic and Power Supply card. If three more pulses are not received in the next 30 seconds, the entire counter circuit will be reset as follows: The reset timer flip-flop Z2B is set by the first pulse and its output (through a buffer Q24) starts a PUT timer Q25. (The time of this circuit may be ajusted by adjustable resistor R63.) The output of the 30-second timer Q25 provides a reset pulse (via Q26) to counter Z1A - Z1B, memory flip-flop Z2A, and reset timer flip-flop Z2B.

In the case where four pulses are received and the alert/not alert signals are sent to the Alarm Logic/Power Supply card 1A1A2A6 the following occurs: NAND gate Z1A operating as an OR logic element, sets flip-flop Q1, Q2, Q3, and Q4. The flip-flop starts 10-second PUT timer Q5 and activates both the buzzer (on 1A1A2A7) and the remote indicator lamp. After the 10-seond timer Q5 runs out, a reset signal is sent to the flip-flop Q1, Q2, Q3 and Q4, and an enabling signal is sent to the five reset gates Z1B, Z2A, Z2B, Z2C, and Z2D. (The function of Z1B is identical to the functions of the four Z2 gates. Micrologic Z1 has two five-input NAND gates, one of which is used as a two-input gate.)

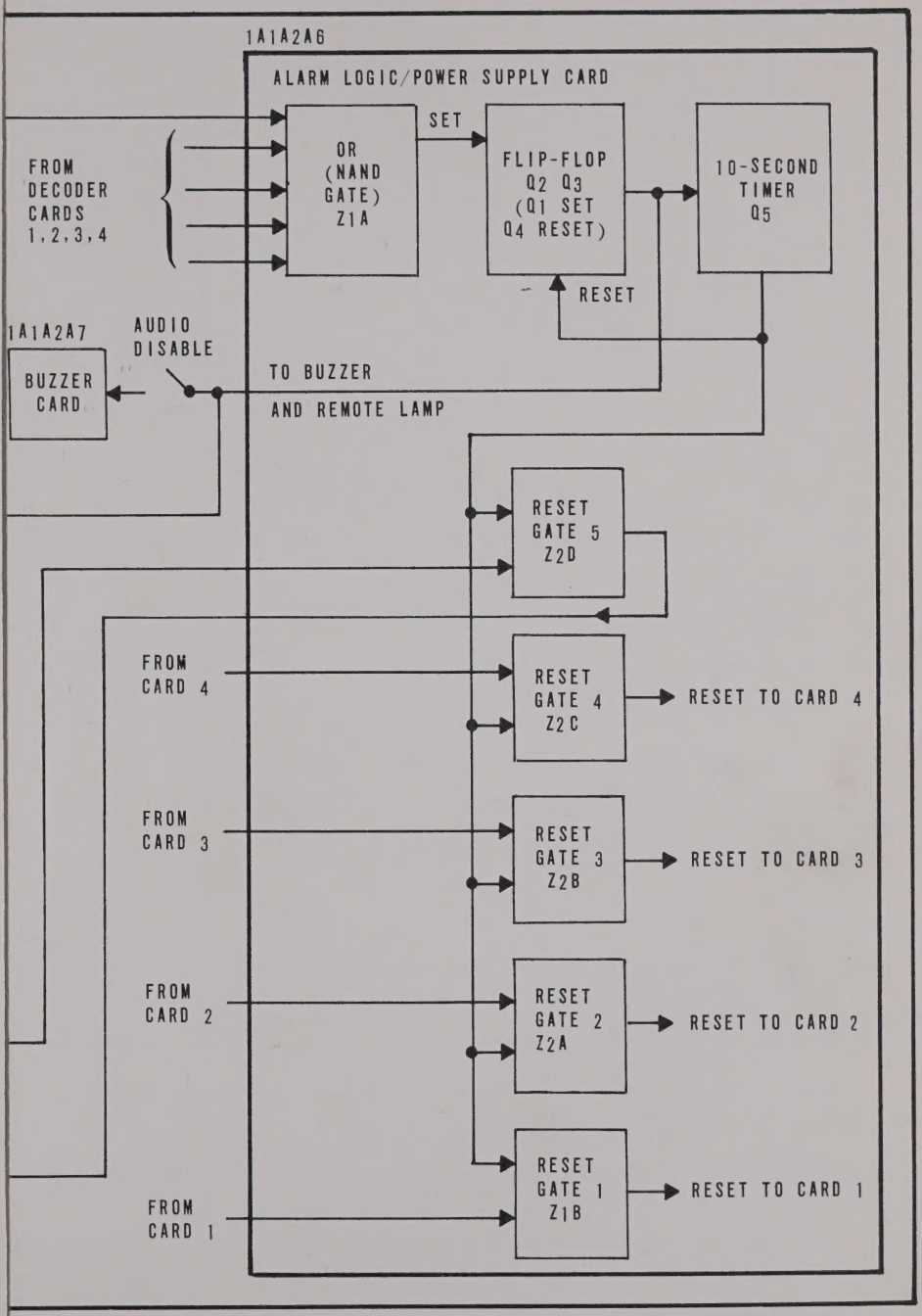
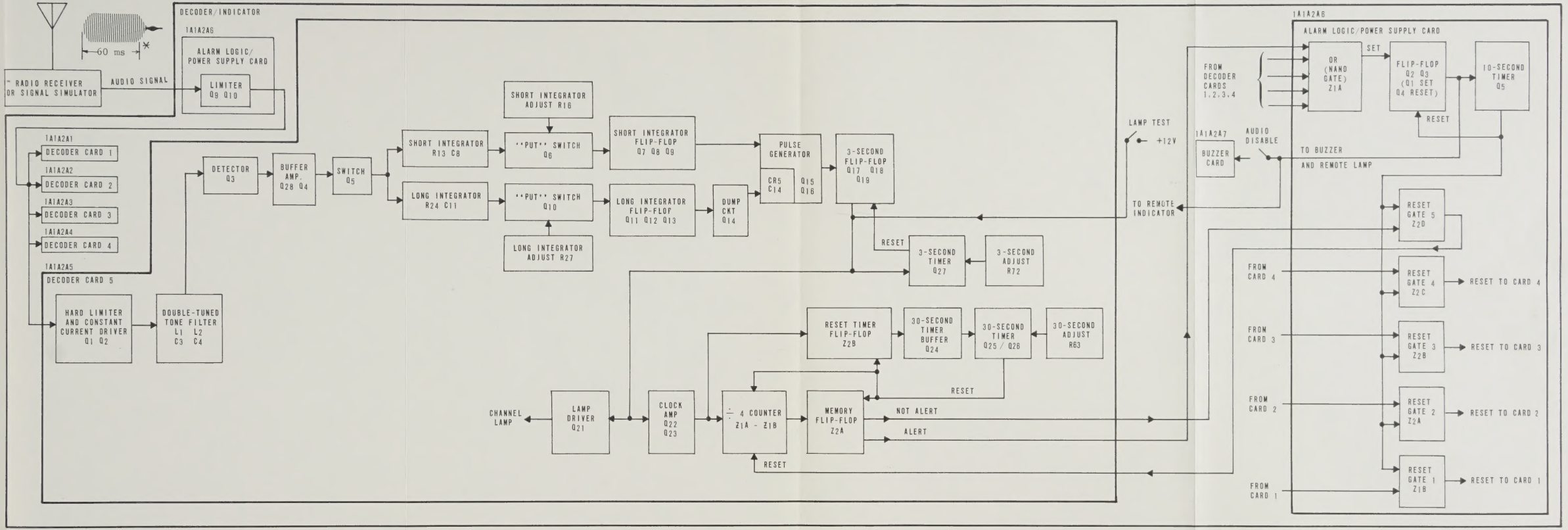


Figure II-1. Decoder Block Diagram



* AMPLITUDE IS A FUNCTION OF PRC-25 VOLUME SETTING

Figure II-1. Decoder Block Diagram

Figure II-2. Timing Logic Diagram

The not-alert signal (from the Decoder card) and the enabling signal from the 10-second timer Q5 activate one of the five reset gates, which in turn resets the counter, memory flip-flop, and reset timer flip-flop in the Decoder card.

The Alarm Logis/Power Supply card and the Decoder card are now both back to the initial state and are ready to detect another signal. Under ideal conditions where every signal transmitted is received and then detected by the Decoder, the process will be repeated continuously - the buzzer sounding for 10 seconds followed by a wait of 20 to 25 seconds before it sounds again.

II-1.4 Reference Data

II-1.4.1 Power Requirements

The Decoder requires 28 VDC at a maximum of 2.75 amp. (This maximum current is required when the AN/PRC-25 is receiving its power from the Decoder and is operating as a transmitter.)

CAUTION

The Decoder must be installed with a negative-ground 28-VDC power source.

II-1.4.2 Weights and Dimensions

The weights and dimensions of the unit and its accessories are given in Table I-1. An outline drawing of the unit is provided in NAVSHIPS 0967-871-3890.

II-1.4.3 Frequencies

The RF operating frequencies are:

Part No.	Frequency
T-1132/PRT	40.90 MHz
T-1133/PRT	43.00 MHz
T-1134/PRT	44.40 MHz
T-1135/PRT	45.90 MHz

The audiofrequencies (or tone modulation) of the five channels are as follows:

Channel 1	4213 Hz
Channel 2	4367 Hz
Channel 3	4539 Hz
Channel 4	4716 Hz
Channel 5	4908 Hz

The length of each tone burst is 60 milliseconds; the time between bursts is about 5 seconds.

Section II-2. Test Equipment and Special Tools

II-2.1 Standard Test Equipment

The equipments listed in Table II-1 (or equivalent) are required.

Several tests in this manual are shown as using the commercial equipment rather than the military. This is done because the special test fixtures provided to the overhaul facility make use of some special features found only in the commercial equipment. These features provide ease and speed of operation under production line conditions but where a military equivalent is indicated it can be used with some minor modifications as follows:

WAVETEK Model 114 Sweep Generator

No military equivalent is listed. If a WAVETEK Model 114 is not available the test could be run using any good audio generator that has good short term stability (± 0.05% for 10 minutes), low jitter (± 0.025% cycle-to-cycle stability), and no more than 0.5% sine wave distortion in the 1 kHz to 10 kHz band. Test fixtures CSC 24-9 would then not be used and fine adjustments of frequency made on the audio generator.

Monsanto Model 100A Frequency Counter

A AN/USM-207 is a good military equivalent. When this counter is used in a test calling for the "OUTPUTS" connector on the Model 100A the OUTPUTS CONNECTOR cable on CSC 24-8 should

Table II-1. Required Test Equipment

NAME	AN TYPE DESIGNATION	ALTERNATE	USE*
Power Supply 0-30 VDC 0-3A	N/A	—	II-3, II-4, II-5, II-6, II-7, II-8, II-9, II-10
Power Supply 0-30 VDC 0-500 ma	(Used for +12 VDC source. Should have ripple under 1% at 500 ma)		II-3, II-4, II-6, II-7 II-10
Sweep Generator/ Audio Oscillator	None	WAVETEK Model 114	II-4, II-5, II-9
Frequency Counter	AN/USM-207	Monsanto Model 100A	II-3, II-4, II-5, II-6, II-7, II-9
Oscilloscope	AN/USM-281	Tektronix Model 543	II-4, II-5, II-9
Oscilloscope Plug-In	N/A	Tektronix Model CA	II-4, II-5, II-9
VTVM	AN/USM-116	HP 410B	II-4, II-8
Resistance Substitution Boxes (2)	CAG-1432-N	Dunkelberger D&D Co. Model 236	II-6
Stop Watch	N/A	N/A	Paragraph II-5.2.2.3
Audio Attenuator (30 dB)		HP 355D	II-5, II-9

* Use reference is to test setup diagram number.

be removed and the following connections made on the CSC 24-8 plug:

Pin No.	Connected to:
5	+3.6 VDC power source
4	Reset input on AN/USM-207
1	Count enable on AN/USM-207
8	Ground (both +3.6 VDC return and AN/USM-207)

Tektronix Model 543 with CA Plug-in

Military unit called for is AN/USM-281. Requirement is for a triggered sweep, usable DC to 5000 Hz.

Tektronix Model 585 with 53/54 Plug-in

Military unit called for is AN/USM-281. Requirement is coverage up to 50 MHz. (This equipment is used in some of the test in Part III.)

II-2.2 Special Tools

Required special test fixtures are listed in Table II-2. These test fixtures and supporting documentation have been provided to the overhaul activity.

Table II-2. Required Special Test Fixtures

Part No.	Nomenclature	Use & Application
CSC 24-2	Dummy Load	Circuit Card Tests
CSC 24-4	Transmitter Simulator	Circuit Card Tests
CSC 24-8	Decoder Alignment & Test Fixture	Circuit Card Tests
CSC 24-9	Sweep Adapter	Audio Filter Alignment
1538 - 09	Test Card*	Standard
1540 - 09	Test Card*	Standard

*Known operable card.

Section II-3. Dismantling and Disassembly

Under normal conditions, disassembly should be limited to the extent necessary to conduct Decoder troubleshooting as given in NAVSHIPS 0967-871-3890. This will allow removal of all circuit cards and access to all remaining components for necessary cleaning and repair. Removal of any other components should be accomplished only after testing shows them to be defective.

(1) Loosen four captive screws holding back cover in place and remove cover.

(2) The five Decoder cards and the Alarm Logic plug-in circuit card may now be removed (if required).

(3) Remove bottom four screws and washers from each side of chassis where it is attached to front panel.

(4) Loosen top screw on each side and swing entire rear chassis up.

(5) The Buzzer card may now be removed (if required).

(6) All other components are now accessible.

(7) If replacement of components on either of the terminal boards is required, boards may be detached from front panel by removal of three holding screws. DO NOT remove white heat-sink compound which coats bottom of terminal boards.

Section II-4. Cleaning

II-4.1 External (Normal)

Normal cleaning of the Decoder should be limited to washing the outer surfaces with a cloth and warm soapy water.

The case seals tightly to the front panel, and cleaning of internal components should not be attempted unless visual inspection shows that it is necessary.

II-4.2 Internal (When Required)

If internal cleaning is required, the entire inside of the unit (including circuit cards*) may be cleaned using hot soapy water and a clean soft paint brush. After cleaning and rinsing with hot clean water, the unit should be dried promptly using low-pressure warm air.

CAUTION

DO NOT use solvents for cleaning; they may soften the fungus-resistant varnish.

Section II-5. Inspection

II-5.1 Visual Inspection

Visual inspect Decoder components as follows:

(1) Check for dents in rear cover, cracks in front panel, damage to seals around indicator lamps and the seal between front panel and rear cover, or other problems that might affect moisture-proof integrity of case.

(2) Inspect lenses for cracks.

(3) Check cables and connectors for broken contacts or bad insulation.

(4) Inspect internal components for dirt, rust, or fungus.

(5) Inspect for obvious defects in wiring insulation, broken or loose connections, cracks in circuit cards, etc.

*Cards should be removed and cleaned separately.

II-5.2 Performance Tests

The procedures contained in the remainder of this section employ several types of general purpose test equipment. Refer to the proper manufacturer's manual for operation of this equipment.

II-5.2.1 System Checkout

Checkout of the Decoder as an operating element in a system requires one Transmitter, Radio T-1132, 1133, 1134 or 1135/PRT, and an AN/PRC-25 Receiver, both of which are known to be operating properly. (Conversely, if a Transmitter is being checked out, a known operable Decoder must be used.)

(1) Set up Decoder and AN/PRC-25 as shown in Figure I-1.

(2) Inspect plastic end cap of Transmitter. The first digit of the serial number stamped on end cap indicates RF operating frequency of the Transmitter. Set AN/PRC-25 to proper frequency.

(3) Station Transmitter approximately 100 yards from AN/PRC-25 and proceed as directed in following paragraphs.

II-5.2.1.1. Transmitter Operating Procedures

(1) Verify Transmitter is off, i.e., line up two straight index marks on large and small diameter portions of Transmitter.

(2) Unscrew end cap from smaller diameter portion of Transmitter and remove battery holder.

(3) Check markings on new battery to find positive (+) and negative (-) ends. Slide battery, negative end first, into battery holder.*

*See NAVSHIPS 0967-871-3890, paragraph 3.1.1.

(4) Verify that positive (+) end of battery is exposed; replace battery holder assembly in Transmitter and tighten end cap.

CAUTION

Do not turn on Transmitter without antenna installed. Permanent damage to Transmitter circuitry could result.

(5) Install two antenna assemblies (Part 1417-09) one on each end of Transmitter.

(6) Devise a method of holding two antennas vertically in a straight line. An easy method is to hang entire unit from any convenient tree branch as shown in Figure I-1.

(7) Set Transmitter to desired code by rotating smaller diameter portion of unit to align straight index mark with proper line of dots.

(8) Check each of five codes, waiting for a signal from Decoder operator that each was received.

NOTE

If conducting a Transmitter checkout, check for an audible tone at PRC-25:

(a) If no tone and PRC-25 does not "quiet" for 60 ms once every 5 sec ., transmitter is not emitting any RF (see III-5.2.2).

(b) If no tone and PRC "quiets", Transmitter is emitting RF but audio is off. Trouble MAY be in switch assembly.

(c) If PRC-25 emits "beeps" but Decoder lamp does not light, audio tone frequency is not within specified limits. Trouble MAY be in switch assembly.

(9) When shutting down transmission, transmitter should be set to off before removing antennas.

(10) Remove battery before placing unit in storage. This avoids damaging Transmitter by turning it on without an antenna installed or from corrosive materials leaking from a discharged battery.

II-5.2.1.2 Decoder Operating Procedures

(1) Connect Decoder, AN/PRC-25, and cables as shown in Figure I-1.

(2) Connect Decoder to a +28 VDC power source (white wire of cable 1441-09 to positive side and black wire to negative side).

CAUTION

The negative (-) side of the 28 VDC power must be grounded.

(3) Set ON-OFF switch on AN/PRC-25 to ON (no squelch).

(4) Set PRESET receive frequency and band selector on PRC-25 to Transmitter frequency.

(5) Set VOLUME control on AN/PRC-25 to at least one-third of full volume.

(6) Set POWER switch on Decoder to ON (green POWER indicator lamp lights).

(7) Depress ALARM CONTROL switch to TEST and then release. (An audible buzzer operates inside Decoder and blue indicator lamp on Remote Alarm Indicator Lamp Assembly Lights.)

(8) Depress LAMP TEST switch to TEST and hold. (CHANNEL indicators 1, 2, 3, 4, and 5 light.) Set LAMP DIMMER control for desired lamp brightness. Release LAMP TEST switch.

(9) Set ALARM CONTROL switch to BOTH.

(10) Receipt of a tone burst of proper frequency will light one of the CHANNEL lamps. If four tone bursts are received on same channel in a 30-second period, buzzer will sound and remote alarm indicator lamp will light.

(11) After proper operation of each channel is observed, signal Transmitter operator to proceed to next channel.

II-5.2.2 Decoder-Indicator Checkout

Operational tests will be performed on each Decoder Channel and on the Alarm Logic/Power Card.

II-5.2.2.1 Preliminary Procedures and Tests

(1) Remove rear cover from Decoder.

(2) Connect test setup as shown in Figure II-3. (See Figure I-1 for details of Decoder setup.)

CAUTION

The negative (-) side of the 28 VDC power source must be grounded.

(3) Set Decoder POWER switch to ON (green POWER indicator lamp lights).

(4) Depress ALARM CONTROL switch to TEST and then release (buzzer operates inside Decoder and blue remote alarm indicator lamp lights).

(5) Depress LAMP TEST switch to TEST and hold (CHANNEL indicators 1, 2, 3, 4, and 5 light). Release LAMP TEST switch.

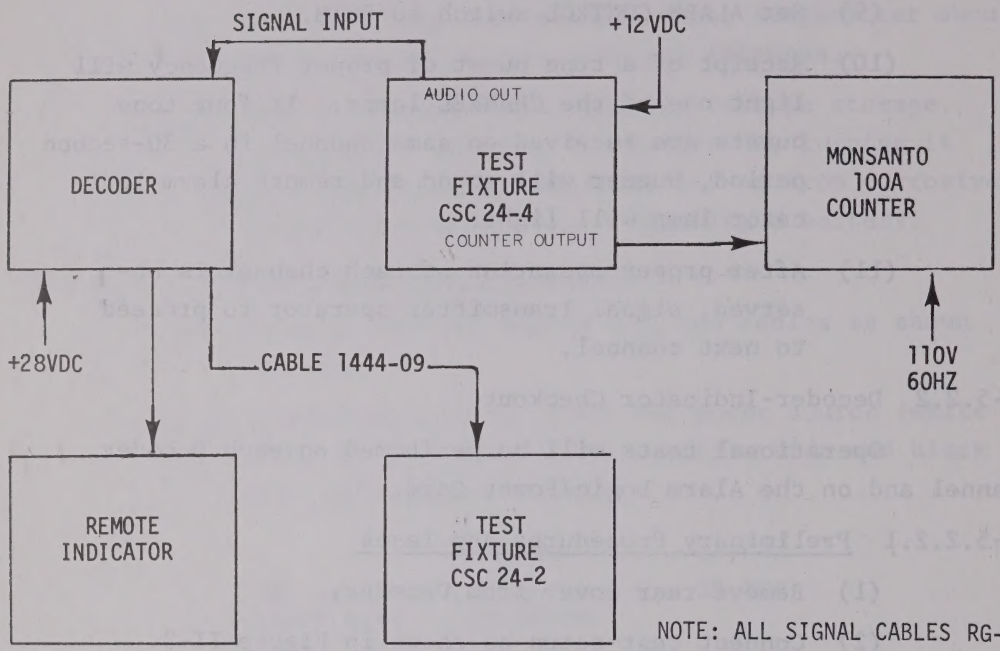


Figure II-3 Preliminary Decoder Tests

II-5.2.2.2 Pulse Width Discriminator and Adjacent Channel Selectivity Test

(1) Set switches on CSC 24-4 as follows:

CHANNEL SELECTOR	1
TIMER TEST	3
PULSE WIDTH SELECTOR	60
CHANNEL FREQUENCY	C

(2) Channel 1 Indicator Lamp indicates proper operation by turning on for 3 seconds when a valid signal is decoded.

(3) Vary positions of CHANNEL FREQUENCY switch and PULSE WIDTH SELECTOR to cover all possible conditions for pulse width discriminator as indicated in Table II-3. Conditions for acceptance are also shown in Table II-3.

(4) Repeat above test for each Decoder channel. Only CHANNEL indicator lights.

II-5.2.2.3 Timer Tests

(1) Set switches on CSC 24-4 as follows:

CHANNEL SELECTOR	1
TIMER TEST	3
PULSE WIDTH SELECTOR	60
CHANNEL FREQUENCY	C

(2) With stopwatch or electric timer measure length of time that the following lamps are lighted:

Channel 1 Indicator Lamp	2.4 - 3.6 seconds
Remote Alarm Indicator Lamp	8 - 12 seconds

(3) Repeat 3-second test of step (2) for each channel.

(4) Set CSC 24-4 timer test switch to 30.

(5) Connect voltmeter to J1 (orange) of Channel 1 Decoder Card.

(6) Start stopwatch or electric timer at first indication on voltmeter of triggering of 30-second timer.

Table II-3. Pulse Width Limits

Channel Frequency	Pulse Width ms	Accept/Reject
Lower	60	Accept
Center	60	"
Upper	60	"
Lower	48	"
Center	48	"
Upper	48	"
Lower	72	"
Center	72	"
Upper	72	"
Lower	86.4	Reject
Center	86.4	"
Upper	86.4	"
Lower	38.4	"
Center	38.4	"
Upper	38.4	"

NOTE

This test is designed to assure that pulse widths between 48 ms and 72 ms are accepted and pulse widths of 86.4 ms and 38.4 ms are rejected. This must be true over the entire range of acceptable variations in the audio frequency of the pulse.

(7) Measure duration of 30-second timer actuation (29-31 seconds acceptable).

(8) Repeat steps (5), (6) and (7) for remaining channels.

II-5.2.2.4 Power Supply Test

(1) On 1540-09 card in slot A6 of card file, measure regulated power supply voltages with differential voltmeter for transmit and receive conditions. Voltages are available on 1540-90 card at the following test points:

Voltage	Test Point
+12V	J3 (Yellow)
+5V	J8 (Orange)
+2.5V	J2 (Brown)
+28V	J5 (Red)
GRD	J1 (Black)

Transmit is simulated by momentarily depressing transmit/receive switch on CSC 24-2 to TRANSMIT position while reading voltage. DO NOT hold TRANSMIT switch ON for more than 30 seconds nor for a duty cycle greater than 20 percent.

(2) Vary lamp dimmer control while observing POWER indicator on front panel. Lamp should vary from maximum brightness to a minimum barely visible in total darkness.

II-5.2.2.5 Alarm System Test

(1) Set Decoder ALARM CONTROL switch to BOTH.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	1
TIMER TEST	3
PULSE WIDTH SELECTOR	60
CHANNEL FREQUENCY	C

(3) Verify that CHANNEL 1 indicator lamp lights and then goes off and that the buzzer sounds only after four consecutive decoder pulses.

(4) Repeat step (3) for remaining four channels.

(5) Set Decoder ALARM CONTROL switch to AUDIO DISABLE.

(6) Verify for all channels that ONLY REMOTE INDICATOR operates after four consecutive decoder pulses.

II-5.2.3 Decoder Card (1538) Checkout

This paragraph and paragraph II-5.2.4 are for conducting tests on circuit cards which have been shown defective by system or Decoder checkout tests. These circuit card tests are also effective on those cards returned for overhaul during field-level repair. It is assumed that the reader is familiar with basic transistor circuitry and that once the general nature of the trouble has been determined by the tests of this paragraph, repairs may be effected. Reference to the functional description of the Decoder given in paragraph II-1.3 will aid in locating the malfunction.

II-5.2.3.1 Audio Filter Alignment Check

(1) Connect test setup as shown in Figure II-4.

(2) Set Sweep Generator function switch to "CONT".

(3) Set frequency control on Sweep Generator to full CW position.

Figure II-4. Audio Filter Alignment

(4) Set CSC 24-9 switches as follows:

CHANNEL SELECTOR	Desired Channel
SWEEP SELECTOR	Manual
MANUAL SWEEP	Full CCW

(5) Set CSC 24-8 POWER switch to ON.

(6) Place oscilloscope test probe in J4 (blue).

NOTE

Assure that vertical display on oscilloscope remains within graticule of scope face or reading of VTVM will be wrong.

(7) Move MANUAL SWEEP control on CSC 24-9 while observing oscilloscope to find exact frequency as read on the counter at which a 12 VDC level change is observed. This frequency should be the Lower Threshold frequency ±2 Hz. (See table II-4.)

(8) Repeat steps (6) and (7) for upper and lower threshold frequencies for each channel.

(9) If readings are out of tolerance, conduct filter alignment as given in paragraph II-6.2.

Table II-4 Audio Filter Alignment Data

Card No.	Lower Threshold* Frequency	Upper Threshold* Frequency	Lower-1 dB Point	Center Frequency	Upper-1 dB Point
1538-09	4150 Hz	4276 Hz	4178 Hz	4213 Hz	4248 Hz
1538-19	4302 Hz	4432 Hz	4329 Hz	4367 Hz	4405 Hz
1538-29	4471 Hz	4607 Hz	4497 Hz	4539 Hz	4581 Hz
1538-39	4645 Hz	4787 Hz	4670 Hz	4716 Hz	4762 Hz
1538-49	4834 Hz	4982 Hz	4857 Hz	4908 Hz	4959 Hz

* These are about the 3-dB down points.

II-5.2.3.2 Filter Limiter Threshold Test

(1) Connect test setup as shown in Figure II-5 and turn on CSC 24-8.

(2) Set audio oscillator to center frequency of card under test and reduce output level to minimum.

(3) Increase output level of audio oscillator until output level of card under test just ceases to increase.

(4) Read nominal input and nominal output levels on oscilloscope:

INPUT 0.25 - 0.50 Vp-p (input B)
OUTPUT 16 - 19 Vp-p (input A)

II-5.2.3.3 Pulse Width Discriminator Tests

(1) Connect test setup as shown in Figure II-6.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	Desired Channel
TIMER TEST	3
PULSE WIDTH SELECTOR	60
CHANNEL FREQUENCY	C

(3) Depress LAMP TEST switch on CSC 24-8 and verify that channel lamp lights.

(4) Verify ALARM operates on fourth decoded pulse when ALARM SELECTOR switch on CSC 24-8 is in BOTH position.

(5) Vary positions of CHANNEL FREQUENCY and PULSE WIDTH selector switches on CSC 24-4 to simulate all possible conditions for pulse discriminator as shown in Table II-3. Channel Indicator Lamp on CSC 24-8 indicates proper operation by lighting for 3 seconds when a valid signal is decoded. Conditions for acceptance are also shown in Table II-3.

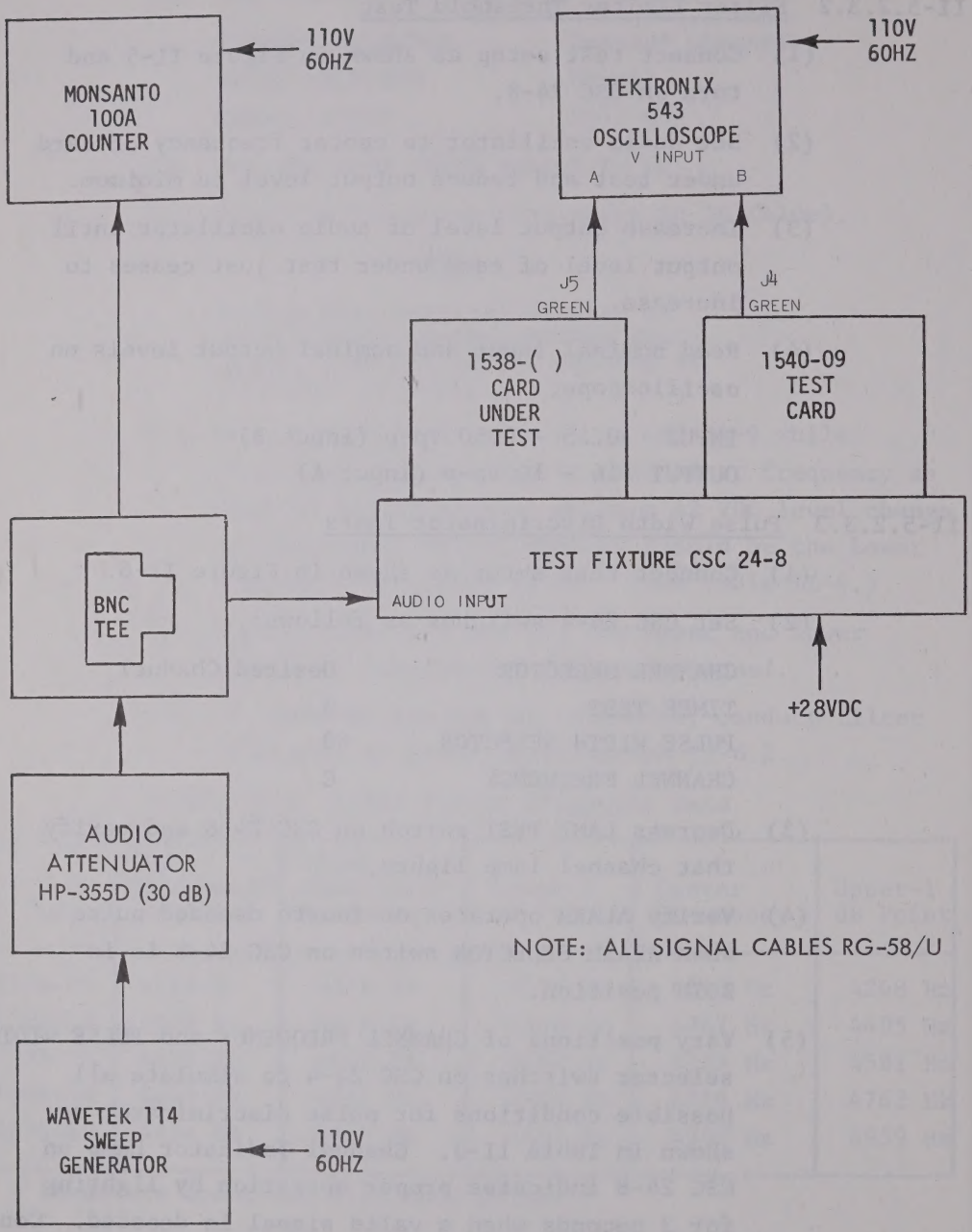


Figure II-5. Filter Limiter Test

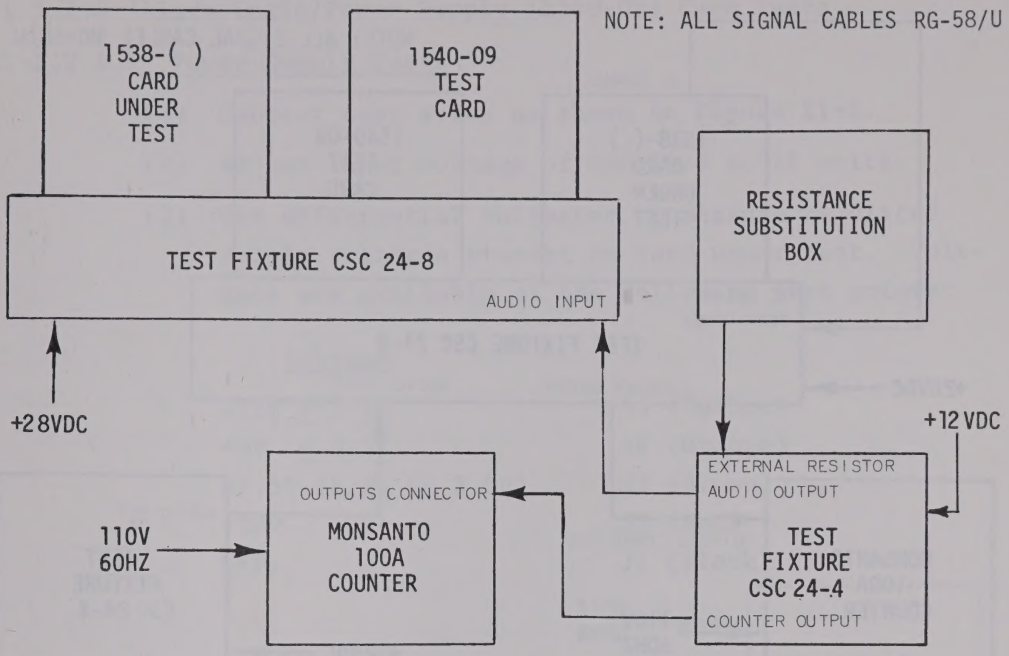


Figure II-6. Pulse Width Discriminator Test

(6) If card fails, see paragraph II-6.3

II-5.2.3.4 Timer Tests

(1) Connect test setup as shown in Figure II-7.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	Desired Channel
CHANNEL FREQUENCY	C
PULSE WIDTH SELECTOR	60
TIMER TEST	3

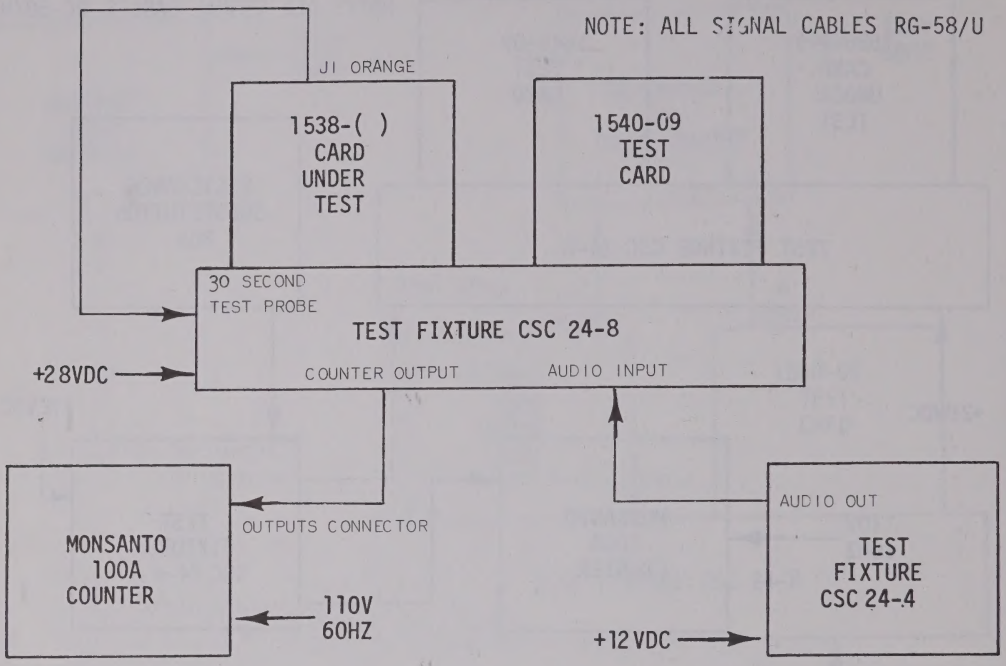


Figure II-7. Timer Tests

(3) Set TIMER TEST switch on CSC 24-8 to 3.

(4) Read 3-second timer length on Counter (2.4 to 3.6 acceptable).

(5) Set TIMER TEST switches on both CSC Test Fixtures to 30.

(6) Read 30-second timer length on Counter (29 to 31 acceptable).

(7) If card fails, see paragraph II-6.4.

II-5.2.4 Alarm Logic/Power Supply (1540-09) Card Tests

II-5.2.4.1 Power Supply Tests

(1) Connect test setup as shown in Figure II-8.

(2) Adjust input voltage of CSC 24-8 to 28 volts.

(3) Use differential voltmeter to measure regulated supply voltages present on card under test. Voltages are available at the following test points:

Voltage	
+12V ± 2.5V	J3 (Yellow)
+5V ± 0.5V	J8 (Orange)
+2.5V (2.25 to 3.0V)	J2 (Brown)
+28V	J5 (Red)
GRD	J1 (Black)

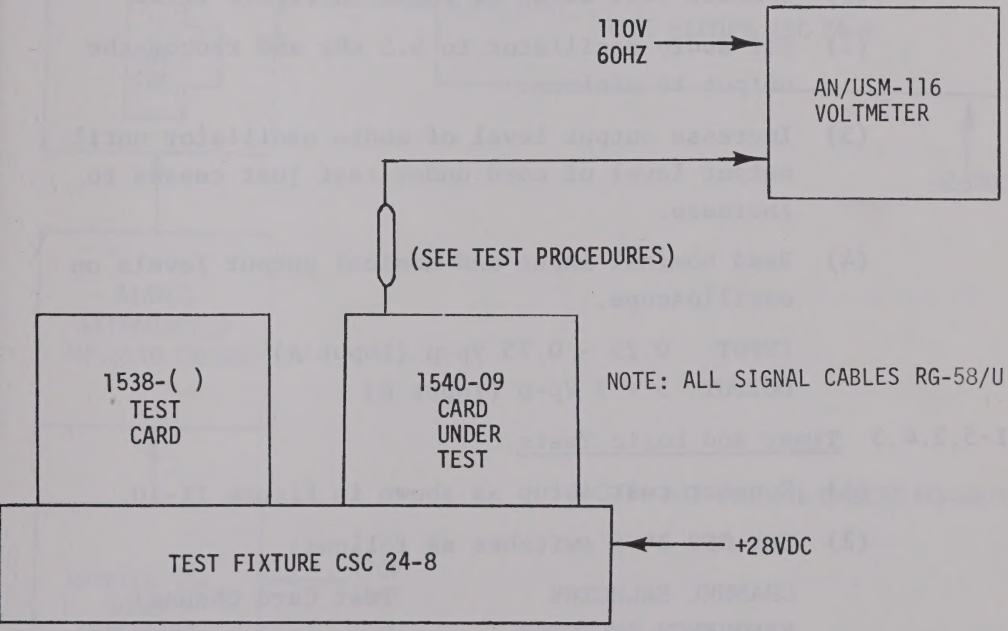


Figure II-8. Power Supply Tests

CAUTION

In the following step, do not hold TRANSMIT switch ON for more than 30 seconds nor for a duty cycle greater than 20 percent.

(4) Simulate Transmit conditions for system by momentarily depressing LOAD switch on CSC 24-8 to TRANSMIT position while reading same voltages indicated in step (3) above.

(5) Observe POWER indicator on CSC 24-8 as lamp dimmer control is rotated from one extreme to other. Lamp should vary from maximum brightness to a level barely visible in total darkness.

II-5.2.4.2 Audio Amplifier Test

(1) Connect test setup as shown in Figure II-9.

(2) Set audio oscillator to 4.5 kHz and reduce the output to minimum.

(3) Increase output level of audio oscillator until output level of card under test just ceases to increase.

(4) Read nominal input and nominal output levels on oscilloscope.

INPUT 0.25 - 0.75 Vp-p (Input A)
OUTPUT 5 - 7 Vp-p (Input B)

II-5.2.4.3 Timer and Logic Tests

(1) Connect test setup as shown in Figure II-10.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	Test Card Channel
FREQUENCY SELECTOR	C
PULSE WIDTH SELECTOR	60
TIMER TEST	3

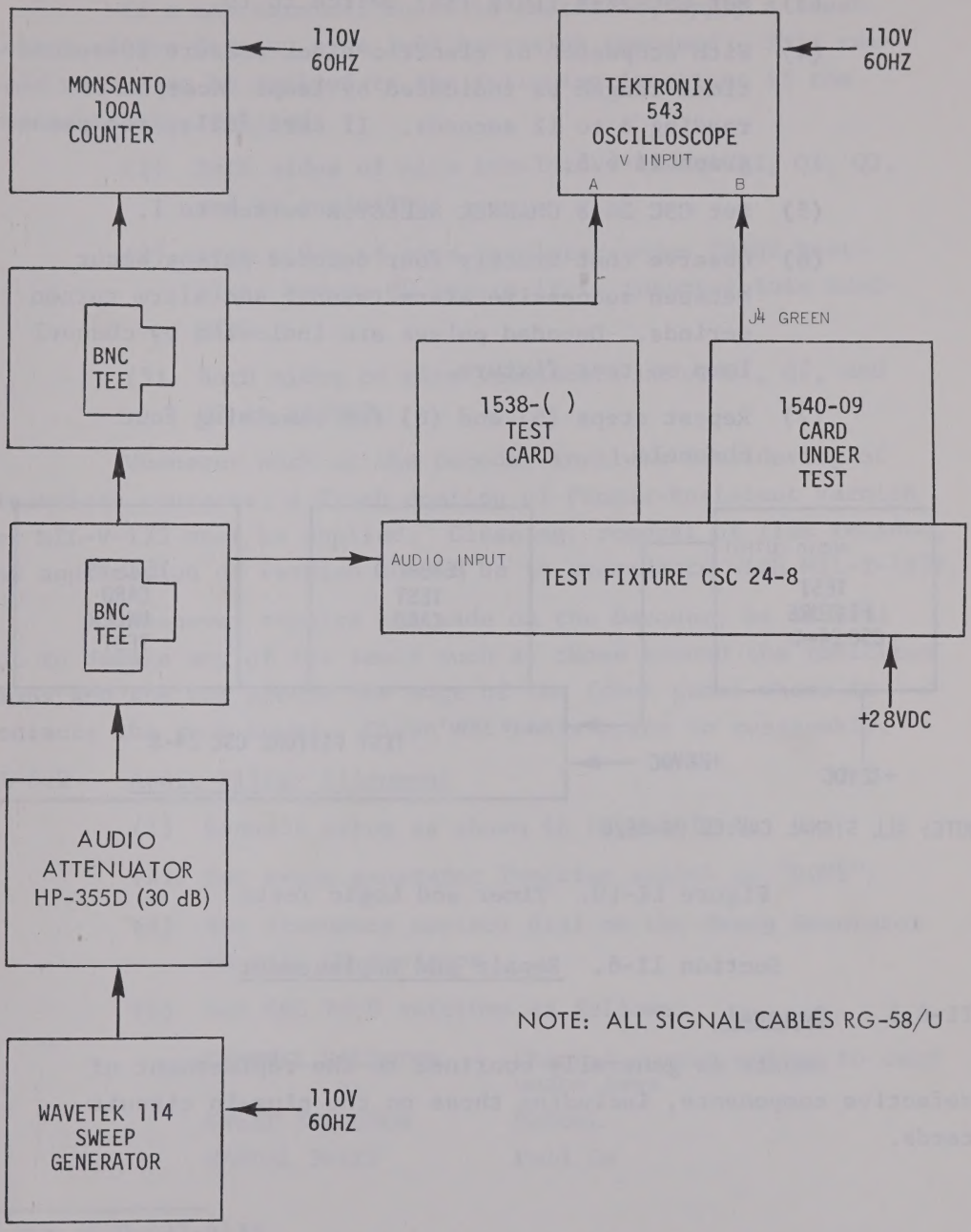


Figure II-9. Audio Amplifier Test

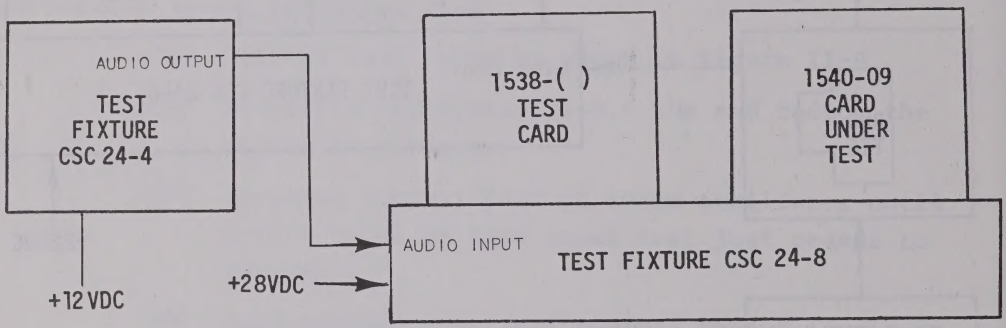
(3) Set CSC 24-8 TIMER TEST switch to 10.

(4) With stopwatch or electric timer measure 10-second timer length as indicated by lamp. Acceptable reading 8 to 12 seconds. If card fails, see paragraph II-6.5.

(5) Set CSC 24-8 CHANNEL SELECTOR switch to 1.

(6) Observe that exactly four decoded pulses occur between successive alarm turnoff and alarm turnon periods. Decoded pulses are indicated by channel lamp on test fixture.

(7) Repeat steps (5) and (6) for remaining four channels.



NOTE: ALL SIGNAL CABLES RG-58/U

Figure II-10. Timer and Logic Tests

Section II-6. Repair and Replacement

II-6.1 General

Repair is generally confined to the replacement of defective components, including those on the plug-in circuit cards.

If a new terminal board is installed, apply a fresh coating of Dow Corning type 340* heat-sink compound. This compound must also be applied to the following locations if the components are replaced:

(1) Both sides of mica insulators under CR1, Q1, Q3, and Q4 on 1A1TB1.

(2) Both sides of mica insulator under TB1Q2 heat-sink, and on Q2 before it is inserted into heat-sink.

(3) Both sides of mica insulators under Q1, Q2, and Q3 on 1A1TB2.

Whenever work on the Decoder involves resoldering of electrical contacts, a fresh coating of Fungus-Resistant Varnish per MIL-V-173 must be applied. Cleaning, removal of flux residue, and application of varnish should be in accordance with MIL-T-152B.

Whenever repairs are made on the Decoder, be careful not to damage any of the seals such as those around the indicator lamps and the one around the edge of the front panel where it contacts the rear cover. Clean all seals prior to reassembly.

II-6.2 Audio Filter Alignment

(1) Connect setup as shown in Figure II-4.

(2) Set sweep generator function switch to "CONT".

(3) Set frequency control dial on the Sweep Generator to full CW position.

(4) Set CSC 24-9 switches as follows:

CHANNEL SELECTOR	Channel corresponding to card under test
SWEEP SELECTOR	MANUAL
MANUAL SWEEP	Full CW

* FSN 5970-933-9135

(5) Use manual sweep control on CSC 24-9 to set Sweep Generator output to channel center frequency. (see Table II-4). Observe frequency on counter.

NOTE

The following adjustments and measurements are all taken on card 1538-( ) unless indicated otherwise.

(6) Connect a jumper between J6 (black) and J7 (yellow).

(7) Place X10 oscilloscope probe on J5 (green).

(8) Adjust L1 for maximum indication on VTVM. Peak is somewhat broad and should be approximated.

(9) Remove jumper from J6 and J7.

(10) Move X10 oscilloscope probe to J7 (yellow).

(11) Adjust L2 for maximum indication on VTVM and center L2 within peak range. Record output levels.

(12) Using manual sweep control on CSC 24-9 set sweep generator output to lower 1 dB frequency and observe level of oscilloscope.

(13) Using manual sweep control on CSC 24-9 set sweep generator output to upper 1 dB frequency and observe level of oscilloscope.

(14) Readings in steps (12) and (13) should BOTH be approximately 1 dB below that recorded in step (11). If such is not the case, readjust L2 to center response about ideal upper and lower 1 dB points.

(15) Move 10X oscilloscope probe to J4 (blue).

(16) Using manual sweep control on CSC 24-9 set sweep generator output to desired lower threshold frequency.

(17) Adjust R75 until level on oscilloscope changes from +12 VDC to 0 (or vice-versa). Fix R75 at point where level just reaches 0 VDC.

(18) Using manual sweep control on CSC 24-9 set sweep generator output to desired upper threshold frequency.

(19) If upper threshold frequency displayed on oscilloscope is not within 1 Hz of ideal frequency, make minor adjustment of L2 and R75 until this condition is reached. Do not readjust L1.

(20) This concludes the Audio Filter Alignment. Lock L1 and L2 tuning slugs with RTV-112.*

II-6.3 Pulse Width Adjustments

(1) Connect setup as shown in Figure II-6.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	Desired Channel
TIMER TEST	3
PULSE WIDTH SELECTOR	40
CHANNEL FREQUENCY	C

(3) Observe channel lamp on CSC 24-8 and adjust R16 until lamp just ceases to light.

(4) Set CSC 24-4 PULSE WIDTH SELECTOR switch to 75.

(5) Adjust R27 until channel lamp on CSC 24-8 just ceases to light.

(6) Set CSC 24-4 PULSE WIDTH SELECTOR switch to EXT.

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* Mfr - General Electric Co.

(7) Measure exact pulse width discriminator reject points by inserting resistance from substitution box and observing frequency counter. Reject points must be ±0.25 ms of 40 and 75 ms, respectively. Readjust R16 and R27, if necessary.

II-6.4 Decoder Card Timer Adjustment

(1) Connect setup as shown in Figure II-7.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	Desired Channel
TIMER TEST	3
PULSE WIDTH SELECTOR	60
CHANNEL FREQUENCY	C

(3) Set TIMER TEST switch on CSC 24-8 to 3.

(4) Adjust R72 until counter indicates 3 seconds ±100 ms

(5) Set TIMER TEST switches on both test fixtures to 30.

(6) Adjust R63 until counter indicates 29.5 seconds ±100 ms.

II-6.5 Alarm/Logic Card Timer Adjustment

(1) Connect setup as shown in Figure II-10.

(2) Set CSC 24-4 switches as follows:

CHANNEL SELECTOR	TEST CARD CHANNEL
FREQUENCY SELECTOR	C
PULSE WIDTH SELECTOR	60
TIMER TEST	3

(3) Set CSC 24-8 TIMER TEST switch to 10.

(4) Adjust R-11 until counter indicates 10 seconds ±100 ms.

II-6.6 Cable Fabrication

Should replacement of any cable assembly or component thereof be required, parts lists for these assemblies not contained in the Technical Manual are provided in Appendix A.

Section II-7. Assembly and Testing of Subassemblies and Assemblies

In this equipment "reassembly" below the unit level is not applicable. Circuit cards that have been repaired should be subjected to the performance tests specified in paragraph II-5.2.3 or II-5.2.4 prior to reinsertion into the Decoder.

Section II-8. Reassembly and Testing of Units

II-8.1 Reassembly

Reassembly is essentially the reverse of disassembly.

II-8.2 Testing of Unit

Testing of the overhauled Decoder shall be accomplished using the procedures and tests prescribed in paragraph II-5.2.2, Decoder-Indicator Checkout. The watertight integrity of the front panel gasket and switches should be tested in accordance with submersible (3-foot) test in MIL-STD-108.

The seals on the switches and connectors are all replaceable. If the gasket on the edge of the front panel does not seal it can be replaced only by a facility that has the specified equipment required to do vulcanizing of rubber.

Section II-9. Final Assembly

Not applicable.

Section II-10. Examination, Testing, and Packaging

II-10.1 Examination

Not applicable.

II-10.2 Testing

Not applicable.

II-10.3 Packaging

Place Decoder in Transit Case (CSC part number 1492) and clamp lid securely.

Section II-11. Difference Data Sheets

Early models of the KY-671/U Decoder-Indicator were equipped with interim circuit cards, numbered in the 1400 series (e.g., 1438 rather than 1538, etc.). These should be replaced whenever a unit having these circuit cards becomes available for overhaul or repair.

Replace 14XX series circuit cards with series 15XX as follows:

1438-09	replace with	1538-09
1438-19	replace with	1538-19
1438-29	replace with	1538-29
1438-39	replace with	1538-39
1438-49	replace with	1538-49
1440-09	replace with	1540-09

The 14XX series cards are to be discarded rather than being repaired.

PART III - TRANSMITTER T-1132 THROUGH 1135/PRT OVERHAUL AND REPAIR

Section III-1. General Information

III-1.1 Introduction (See Part I for system information.)

The Transmitter T-1132 through 1135/PRT is a battery-operated, flashlight-size device with two antennas (actually, an antenna and a counterpoise). The heart of the Transmitter is a circuit module encapsulated in epoxy Resin. Field level repair is confined to battery, antenna, and battery canister replacement.

III-1.2 Scope

This manual provides instructions for testing the Transmitter and procedures for overhaul when overhaul is possible. The encapsulated unit, except for the switch assembly, is non-repairable. The normal sequence of tests and repairs, designed to eliminate unnecessary disassembly, is as follows:

Procedures	Paragraph Ref.
Clean Outer Surfaces	III-4.1
Remove Battery Canister and Visually Inspect	III-5.1
Clean Internal Areas	III-4.2.1
Perform System Checkout	II-5.2.1
Check Canister Resistance	III-5.2.2
Perform Transmitter Checkout	III-5.2.3
Remove Switch Cap	III-3.2
Visually Inspect Switch	III-5.1
Clean Switch	III-4.2.2
Test Tone Frequency	III-5.2.4

Procedures	Paragraph Ref.
Disassemble Switch	III-3.3
Replace Switch	III-6.1
Replace Switch Cap	III-8.1

III-1.3 Functional Description

A block diagram, schematic, and functional description of the Transmitter are provided in NAVSHIPS 0967-871-3890.

III-1.4 Reference Data

III-1.4.1 Power Requirements

The Transmitter is powered by a special 13.5V battery (Part No. 1484-01).

III-1.4.2 Weights and Dimensions

Weights and dimensions of the unit and its accessories are given in Table I-1. An outline drawing of the unit is provided by NAVSHIPS 0967-871-3890.

III-1.4.3 Frequencies

Audio frequencies (or tone bursts) of the five channels are as follows:

	Audio Frequency
Channel 1	4213 Hz
Channel 2	4367 Hz
Channel 3	4539 Hz
Channel 4	4716 Hz
Channel 5	4908 Hz

The length of each tone burst is 60 milliseconds; the time between burst is approximately 5 seconds.

Radio Frequencies for the various units are as listed below:

Part No.	Frequency
T-1132/PRT	40.90 MHz
T-1133/PRT	43.00 MHz
T-1134/PRT	44.40 MHz
T-1135/PRT	45.90 MHz

Section III-2. Test Equipment and Special Tools

III-2.1 Standard Test Equipment

The test equipment required is listed in Table III-1 See paragraph II-2.1 for notes on substitution of military for commercial equipment.

Table III-1. Test Equipment

Name	AN Type Designation	Alternate	Use
Frequency Counter	AN/USM-207	Monsanto 100A	Para III-5.2.4
Ohmmeter	AN/USM-311	--	Para III-5.2.2
Oscilloscope	AN/USM-281	Tektronix Model 585 with Type 53/54k Plug-in	Para III-5.2.4

III-2.2 Special Tools

Required special test fixtures:

CSC 24-1 Modulation Test Fixture
1532-09 Test Fixture
1531-01 (2) Insertion tool
1531-02 Extraction tool

Section III-3. Dismantling and Disassembly

III-3.1 General

Normal disassembly is confined to removal of antenna, battery, and battery canister. Except for battery replacement, no disassembly should be attempted until the Transmitter has been shown to be defective through a System Checkout as described in paragraph II-5.2.1 of this manual.

III-3.2 Switch Cap Removal

Disassembly of the Transmitter to gain access to the switch assembly may be accomplished as follows:

(1) Turn off Transmitter (two long index marks aligned).

(2) Remove antennas, battery canister, and battery.

(3) Locate an RTV filled hole above index marks. An identical hole is located 180° from this hole.

(4) Place Transmitter on a piece of soft wood (pine) with index marks facing directly upward in an arbor press (or equivalent).

CAUTION

The shock of driving the pin out with a hammer may break the crystal or damage the pin or cap.

(5) Put pin extraction tool (part No. 1531-02) in press and carefully press out roll pin through RTV filled hole.

(6) Switch cap may now be removed for access to switch assembly.

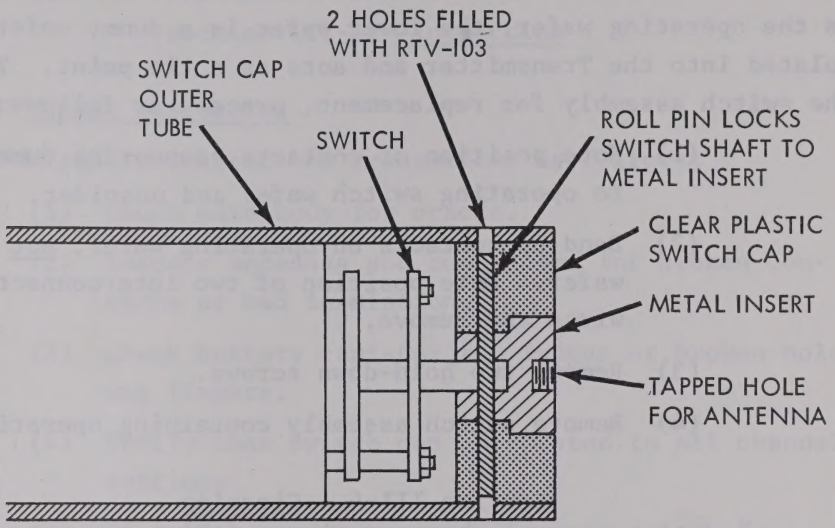

Figure III-1. Switch Cap Removal

NOTE

Do not lose two (2) waffle washers that are installed between top of switch shaft and metal insert in end cap.

III-3.3 Switch Removal

The switch is a two-wafer assembly. The upper wafer is the operating wafer; the lower wafer is a dummy wafer encapsulated into the Transmitter and acts as a tie point. To remove the switch assembly for replacement, proceed as follows:

(1) Note position of contacts connecting dummy wafer to operating switch wafer and unsolder.

(2) Bend up contacts on operating wafer, not dummy wafer. Note position of two interconnection wires and remove.*

(3) Remove two hold-down screws.

(4) Remove switch assembly containing operating wafer.

Section III-4. Cleaning

III-4.1 External (Normal)

Normal cleaning for the Transmitter should be limited to washing the outer surfaces with warm soapy water.

*These contacts and wires must be replaced when replacing the switch as per paragraph III-6.1.

III-4.2 Internal (when required)

The switch assembly, battery canister, and inside of battery compartment may be cleaned with Trichloroethylene.

CAUTION

Do not get Trichloroethylene on Lexan plastic end cap.

Section III-5. Inspection

III-5.1 Visual Inspection

Visually inspect the Transmitter as follows:

(1) Check main body for cracks.

(2) Inspect antennas and connectors for broken contacts or bad insulation.

(3) Check battery canister for fungus or broken holding fingers.

(4) Verify that switch can be rotated to all channel settings.

(5) If switch cap is removed, inspect switch for broken contacts, loose connections, defects in insulation, etc.

III-5.2 Performance Tests

III-5.2.1 System Checkout

Procedures for checkout of the Transmitter as an operational element in a system are presented in paragraph II-5.2.1 of this manual.

III-5.2.2 Battery Canister Resistance Check

(1) Turn off Transmitter.

(2) With an ohmmeter, measure resistance between battery canister upper spring (+) and side of canister (-). Proper reading should be infinity. (See Figure III-2.)

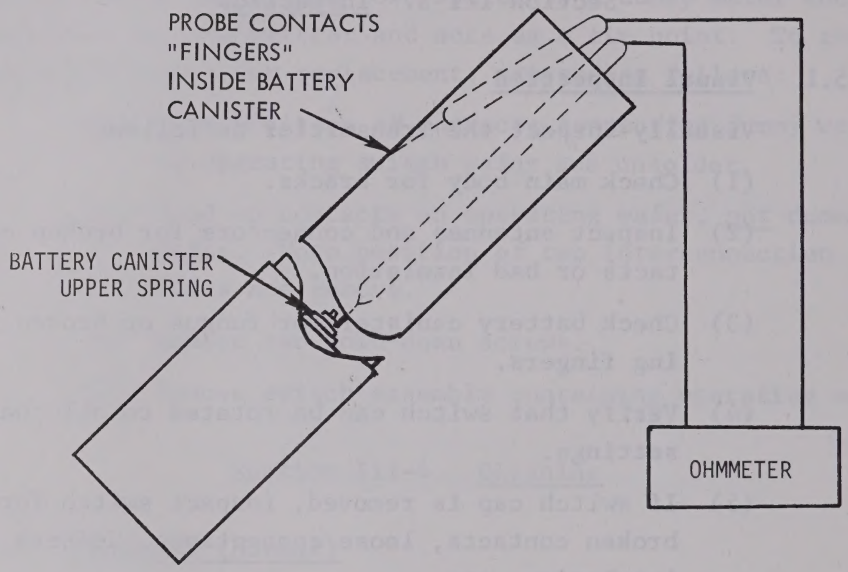

Figure III-2. Battery Canister Upper Spring Location

(3) Set Transmitter switch to each channel position in turn and repeat resistance readings. Proper readings are approximately 3000 ohms ± 50%.

(4) If reading at any position indicates a short, reverse leads and remeasure.

(a) If still shorted, inspect mechanical components of battery canister for foreign objects or loose screws.

(b) If not shorted, trouble MAY be caused by switch assembly.

III-5.2.3 Transmitter Checkout

(1) Connect test setup as shown in Figure III-3.

(2) Set the selector switch of test fixtures CSC-24-1 to RF PULSE WIDTH. Set the FUNCTION switch of the Counter Timer to Milliseconds position giving the most significant digits.

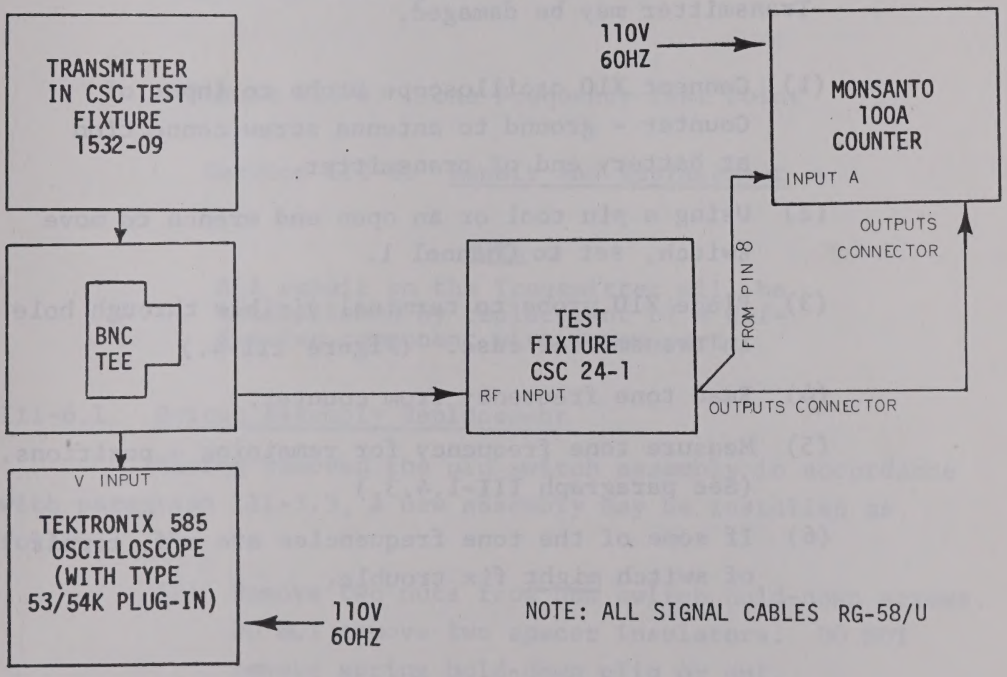

Figure III-3. Transmitter RF Test Setup

(3) Turn on the Transmitter and measure the period of the RF pulse. (60 msec ± 20%.) Set the selector switch of the test fixture to RF PULSE REP RATE. Set the FUNCTION switch of the Counter Timer to "Period A" and the FREQUENCY-TIMER switch to the "Seconds".

(4) Turn the transmitter ON and measure the period between RF pulses. (5.0 sec ± 20%.)

III-5.2.4 Tone Frequency Test

CAUTION

DO NOT make any ohmmeter readings on the switch since internal components of the Transmitter may be damaged.

(1) Connect X10 oscilloscope probe to input of Counter - ground to antenna screw connection at battery end of transmitter.

(2) Using a pin tool or an open end wrench to move switch, set to Channel 1.

(3) Place X10 probe to terminal visible through hole in transmitter case. (Figure III-4.)

(4) Read tone frequency from counter.

(5) Measure tone frequency for remaining 4 positions. (See paragraph III-1.4.3.)

(6) If some of the tone frequencies are off, repair of switch might fix trouble.

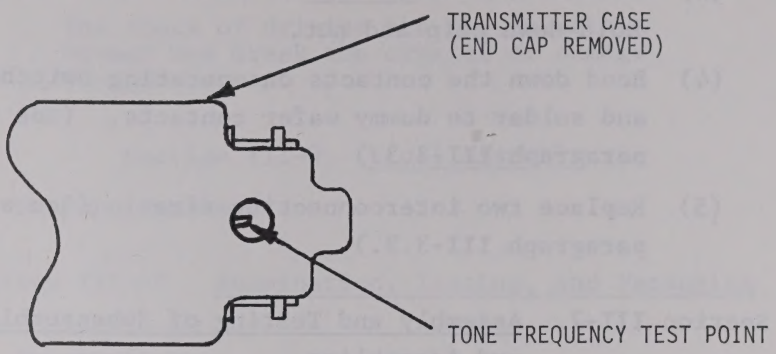

Figure III-4. Tone Frequency Test Point

Section III-6. Repair and Replacement

NOTE

All repair on the Transmitter will be accomplished by replacement of a defective component with a new part.

III-6.1 Switch Assembly Replacement

Having removed the old switch assembly in accordance with paragraph III-3.3, a new assembly may be installed as follows:

(1) Remove two nuts from new switch hold-down screws. DO NOT remove two spacer insulators. DO NOT remove spring hold-down clip or nut.

(2) Position new switch so that portion of wafer with two contacts one above the other is over channel 1 and channel 2 markers on body of Transmitter.

(3) Secure hold-down screws. Remove and discard spring hold-down clip and nut.

(4) Bend down the contacts on operating switch wafer and solder to dummy wafer contacts. (See step 1, paragraph III-3.3.)

(5) Replace two interconnecting wires. (See step 2, paragraph III-3.3.)

Section III-7. Assembly and Testing of Subassemblies and Assemblies

Not applicable.

Section III-8. Reassembly and Testing of Units

III-8.1 Reassembly

Reassembly of the switch cap to the main body shall be accomplished as follows:

(1) Lubricate a new Quad-ring seal (Q4024EP) with Dielectric Grease MIL-S-8660 and install on main body.

(2) Insert waffle springs "back to back" with convex surfaces in contact with each other.

(3) Slide cap on in proper position.

(4) Place two pin tools (part No. 1531-01) in an arbor press (or equivalent).

(5) Drop in roll pin.

(6) Press pin into place.

(7) Fill holes with RTV 103*.

CAUTION

The shock of driving the pin in with a hammer may break the crystal or damage the pin or cap.

Section III-9. Final Assembly

Not applicable.

Section III-10. Examination, Testing, and Packaging

III-10.1 Examination

Not applicable.

III-10.2 Testing

Not applicable.

III-10.3 Packaging

The Transmitter shall be packaged for shipment as follows:

(1) Wrap transmitter in tissue per MIL-UU-P-553, Type II and tape to secure using ½ inch wide glass filament tape per MIL-PPP-T-97, Type 2.

(2) Wrap two (2) antenna, part number 1417-09 in a maximum outside diameter of 2-1/8 inches and tape secure using ½ inch wide glass filament tape per MIL-PPP-T-97 Type 2.

*Mfr General Electric Co.

(3) Wrap each antenna separately with tissue per MIL-UU-P-553 Type II and tape to secure using ½ inch wide glass filament tape per MIL-PPP-T-97 Type 2.

(4) Place Transmitter and two (2) Antenna, one at each end of Transmitter in a bag per MIL-STD-131, Class 1, and seal.

(5) Mark bag per MIL-STD-129. Marking data as follows:

MFR Part No. 1300-XX (XX appropriate number)
Transmitter, Radio; T-113X/PRT (X appropriate number)
1 each
N00039-69-C-3505
A-X/XX (month/year)
Serial No. _____

(6) Wrap sealed bag in cellulose wadding per MIL-PPP-C-843.

(7) Place wrapped bag in carton RSC, CF per PP-8-636-V3C. Close carton and seal with tape per MIL-UU-T-116, 3 inches wide.

(8) Mark carton as per MIL-STD-129. (See (5) above.)

Section III-11. Difference Data Sheets

Not applicable.

APPENDIX A

PARTS LIST FOR CABLE ASSEMBLIES

Power Input Cable Assembly (1441-09)

Part No.	Description	Qty	Remarks
KPT06A-8-3S	Connector	1	ITT Cannon
MS 3057-6B	Cable Clamp	1	
C002MGF2/ 20SJ0290	Cable	10 ft	MIL-C-3432
S11-PT86-65C	Adapter	1	SUNBANK
ECCEP-301-3/16	Tubing, Heatshrink	1.12"	
MS 3180-8C	Plug, Protective Cap	1	BENDIX
1533-01	Lug, Crimp	1	
HH300907	Wire, Insulated	2.0"	
SN60WRP	Solder	AR	
FIT 105 3/8	Tubing, Heatshrink	1.0"	
MIL-V-173	Varnish, Clear	AR	

Audio Input Cable Assembly (1442-09)

UG-88/U	Connector	1	
U-299/U	Connector	1	
RG58A/U	Cable	3 ft	
CW-282/U	Cap, Protective (UG88/U)	1	
1482	Cap, Protective (U-229/U)	1	
MIL-V-173	Varnish, Clear	AR	

APPENDIX A (Continued)

Remote Indicator Cable Assembly (1443-09)

Part No.	Description	Qty	Remarks
KPT06A-8-3P	Connector	1	ITT Cannon
MS 3057-6B	Cable Clamp	1	
UG-89B/U	Connector	1	
RG-58A/U	Cable	10 ft	
S11-PT86-1.SC	Adapter	1	SUNBANK
AN3420-6A	Bushing	1	
MS 3180-8C	Cap, Protective	1	BENDIX
1463-09	Cap, Protective	1	
SN60WRP2	Solder	AR	
ECCEP-301-3/16	Tubing, Heatshrink		
ECCEP-301-3/32	Tubing, Heatshrink		
MIL-V-173	Varnish, Clear		
QQ-W-343-S/22	Wire, Uninsulated		

Power Output Cable Assembly (1444-09)

KPT06A-8-3PW	Connector	1	ITT Cannon
MS 3057-6B	Cable Clamp	1	
SM-C-447929	Connector	1	
C003MGF3/ 22SJ305	Cable	10 ft	MIL-C-3437
S11-PT86-1-5C	Adapter	1	
AN3420-6A	Bushing	1	
MS 3180-8C	Cap, Protective	1	BENDIX
	Cap, Protective	1	